REMARKS

Preliminarily, in response to the Examiner's request, Applicant submits Form PTO-1449 for the Information Disclosure Statement filed October 20, 2005, and also lists JP 57-113834 inadvertently not initialed on Form PTO-1449 for the Information Disclosure Statement filed June 22, 2005. Applicants respectfully request the Examiner to return initialed Form PTO-1449.

As claimed in the method of amended claim 6, the flue gas NO_x removal apparatus consists of a plurality of NO_x removal catalyst layers 14A, 14B, 14C, 14D provided in the gas flow direction, each catalyst layer being composed of a plurality of honeycomb NO_x removal catalysts 14 juxtaposed in a direction crossing the gas flow direction. Each honeycomb NO_x removal catalyst having gas conduits 14A for feeding an exhaust gas from an inlet to an outlet of each conduit and performing NO_x removal on the sidewalls of the conduit. The NO_x removal catalyst forming the respective NO_x removal catalyst layers each has an approximate length such that the flow of exhaust gas fed into the gas conduits is straightened in the vicinity of the outlet, has a length (Lb) specified by a sustained turbulent flow distance (Lt) which is the distance from the inlet to a site where turbulent flow energy is lost in the course of transition from turbulent flow to laminar flow, and that two NO_x removal catalyst layers adjacent to each other are disposed with a space 19 therebetween, the space 19 serving as a common gas conduit where exhaust gas flows discharged through the NO_x removal catalysts are intermingled.

In reference to Applicant's published application (US 2006/0154803 A1), conventionally, typical honeycomb NO_x removal catalysts have a gas conduit pitch of 7 mm and a length of about 700 mm to 1,000 mm. The present inventors investigated the deterioration status of such catalysts after use along a longitudinal direction, and found that the catalysts are more deteriorated on the inlet side than on the outlet side, and that the deterioration status is virtually

unchanged in a portion ranging from the 300 mm site from the inlet to the outlet. The present invention has been accomplished on the basis of these findings.

Specifically, an exhaust gas is fed into an NO_x removal catalyst through gas conduits as a turbulent flow, and NO_x removal reaction is performed through contact of the gas with the sidewalls of the gas conduits. However, the flow of the thus-reacted exhaust gas is gradually straightened. Contact of the straightened gas flows with the sidewalls of the conduits is minimized, thereby failing to attain effective NO_x removal. See paragraph [0038].

As described in paragraph [0040], the length of the NO_x removal catalysts each is set so as to maintain turbulent flow throughout. Thus, as compared with conventional cases in which two stages of NO_x removal catalysts each having a length of 700 mm to 1,000 mm are employed, use of three or four or more stages each having a length of about 300 mm remarkably enhances NO_x removal performance. Preferably, two NO_x removal catalyst layers adjacent to each other are disposed with a space therebetween such that the gas flows discharge through the respective NO_x removal catalysts are intermingled to reestablish turbulent flow.

In response to the rejection of claims 1-5 under 35 U.S.C. § 102(b) as anticipated by, or in the alternative, under 35 U.S.C. § 103(a) as obvious over U.S. Patent 3,785,781 to Hervert et al, claims 1-5 have been canceled to thereby obviate the foregoing rejection.

Claims 6-10 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Hervert et al in view of U.S. Patent 4,407,785 to Pfefferle. The Examiner relied on Pfefferle as teaching the advantages of including spaces between catalyst layers in a multi-stage catalyst.

Hervert et al was cited as disclosing a catalyst defined by several catalytically active honeycombs of varying pore sizes, where the length of each honeycomb is said to be defined by the length that the fluid maintains turbulent flow (i.e., an initial square velocity profile). When

the velocity profile becomes parabolic and the boundary layer becomes stagnant, catalytic activity decreases and a second (non-catalytic) honeycomb structure with a different pore size is used to reestablish turbulent flow. The process is repeated, to establish turbulent flow throughout.

Applicants respond as follows.

A characteristic feature of the invention as claimed in claim 6 is that the length (Lb) of the respective NO_x removal catalysts is set so as to maintain turbulent flow throughout and thereby remarkably enhance NO_x removal performance. A second characteristic feature of the invention is that a space is disposed between adjacent NO_x removal catalyst layers serving as a common gas conduit where exhaust gas flows discharged through the NO_x removal catalysts are intermingled.

Fig. 1 of Hervert et al shows catalyst element 30 which comprises a catalytically active first skeletal structure 12 having a plurality of flow paths 31 extending therethrough, a second skeletal structure 13 having a plurality of flow paths 32 extending therethrough, a catalytically active third skeletal structure 14 having a plurality of flow paths 33 extending therethrough, a fourth skeletal structure 15 having a plurality of flow paths 34 extending therethrough and a catalytically active fifth skeletal structure 16 having a plurality of flow paths 35 extending therethrough. That is, skeletal structures 12, 14 and 16 are catalytically active, whereas skeletal structures 13 and 15 are catalytically non-active.

The combination of the catalyst element 30 shown in Fig. 1 of Hervert et al and Pfefferle's spaces would have air spaces between each of the five skeletal structures.

That is, the combination suggested by the Examiner would have a second catalytically non-active skeletal structure 13 and a fourth catalytically non-active skeletal structure 15, which

are useless and obstructive structures, and would not allow the flue gas to be catalyzed more efficiently and homogeneously.

Not only does amended claim 6 define the length (Lb), but also excludes the second catalytically non-active skeletal structure 13 and the fourth catalytically non-active skeletal structure 15 of Hervert et al, alone or in combination with Pfefferle.

Hervert discloses, in Fig. 3, a catalyst element which comprises three catalytically active elements 50, 51 and 52, wherein the element 50 has a smaller channel size than element 51 and the element 52 has a smaller channel size than the element 51. Here, the length of the elements 50 and 52 should be such that a mass transfer limiting concentration gradient is just established and the length of the element 51 should be such that a square concentration profile is reestablished prior to entry into the next element 52. See col. 5, lines 33-38. Consequently, the length of element 51 of Hervert et al is not defined by a length (Lb) along which the fluid maintains a turbulent flow.

Therefore, the catalyst resulting from the combination of Hervert et al and Pfefferle is different from that of amended claim 6, and it is respectfully submitted that the amended claims are patentable over the cited prior art.

Withdrawal of the foregoing rejection under 35 U.S.C. § 103(a) is respectfully requested.

Withdrawal of all rejections and allowance of claims 6-10 is earnestly solicited.

In the event that the Examiner believes that it may be helpful to advance the prosecution of this application, the Examiner is invited to contact the undersigned at the local ,Washington, D.C. telephone number indicated below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,

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Date: May 15, 2008